CLINICOPATHOLOGICAL EVALUATION OF CERVICAL NODAL METASTASIS IN PHARYNGEAL AND LARYNGEAL TUMOURS

DISSERTATION SUBMITTED FOR

MASTER OF SURGERY - BRANCH – IV

(OTO-RHINO-LARYNGOLOGY)

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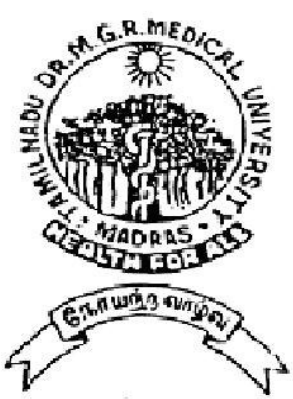

THE TAMILNADU

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CHENNAI, TAMILNADU

BONAFIDE CERTIFICATE

This is to certify that the dissertation entitled "**CLINICOPATHOLOGICAL EVALUATION OF CERVICAL NODAL METASTASIS IN PHARYNGEAL AND LARYNGEAL TUMOURS"** submitted by **Dr. K. LEENA RAJAM** under my supervision and guidance in partial fulfillment for the award degree of Master of Surgery in Otorhinolaryngology by the Tamil Nadu Dr. M.G.R. Medical University, Chennai is a bonafide record of the work done by him during the period between November 2010 to November 2011 in Govt. Rajaji Hospital, Madurai.

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DECLARATION

I **Dr. K. LEENA RAJAM s**olemnly declare that the dissertation titled **"CLINICOPATHOLOGICAL EVALUATION OF CERVICAL NODAL METASTASIS IN PHARYNGEAL AND LARYNGEAL TUMOURS"** has been prepared by me. I also declare that this bonafide work or a part of this work was not submitted by me or any other for any award, degree, diploma to any other University board either in India or abroad.

This is submitted to The Tamilnadu Dr. M. G. R. Medical University, Chennai in partial fulfillment of the rules and regulations for the award of Master of Surgery degree **Branch–IV (Oto rhino laryngology)** to be held in **April 2012.**

Place : Madurai **Dr. K. LEENA RAJAM**

Date :

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CLINICOPATHOLOGICAL EVALUATION OF CERVICAL NODAL METASTASIS IN PHARYNGEAL AND LARYNGEAL TUMOURS

2.0 AIMS AND OBJECTIVES

- To determine the incidence of cervical node metastasis by the site of primary.

- To describe the distribution of neck node secondaries by the site of primary.

- To correlate individually the size of tumour with the incidence of cervical node metastasis and the time of initial presentation.

- To determine the different types of malignancy.

3.0 DESIGN OF STUDY

3.1 PRIMARY PURPOSE: Clinicopathological evaluation

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3.3 SELECTION OF STUDY SUBJECTS:

3.3.1 Ages Eligible for Study : 18 Years to 80 Years

3.3.2 Genders Eligible for Study : Both

3.3.3 Total no of patients included in the study : 61

3.3.4 Inclusion Criteria:

All patients presenting with swelling in the neck with palpable nodes more than 1 cm in size, firm to hard in consistency and spherical rather than ovoid. All patients with palpable nodes in the site of drainage of the primary.

3.3.5 Exclusion Criteria:

Inability to fully evaluate or confirm diagnosis by histology.

3.4 DATA COLLECTION: Through clinical examination followed by biopsy and FNAC reports.

4.0 METHODOLOGY

4.1 A detailed history was obtained including information as to whether the patient had ENT, respiratory, gastrointestinal or urinary symptoms.

4.2 A complete physical examination was then carried out including a postnasal examination and an indirect laryngoscopy for characteristics of primary in terms of site, extent, size, macroscopic appearance, degree of local infiltration, presence of synchronous lesion and the T Stage.

4.3 The palpable nodes were considered significant if they were more than 1 cm in size, firm to hard in consistency, spherical rather than ovoid and those in the site of drainage of the primary.

4.4 The important features noted regarding the nodes during palpation include the location, level of the node, size, consistency, number of nodes and the group to which they belong, as well as signs of extracapsular spread such as invasion of the overlying skin, fixation to deeper tissues or paralysis of cranial nerves or

sympathetics. The presence of contralateral nodes and the N-stage was also determined.

4.5 The clinical impression of the first observer was confirmed by atleast one other observer.

4.6 A fine needle aspiration cytology of the nodes was then done.

4.7 Biopsy from the primary site was done in all cases to know the nature and degree of differentiation of the primary.

5.0 RESULTS

Out of the 61 patients selected for the study, males predominate over females with a male to female ratio of 5.8:1. The age incidence is identical to that seen in the West with the maximum incidence in the sixth decade. Our patients tend to present late in the course of their disease and this is reflected in the high incidence of N2 (about 57%) neck among those with palpable cervical metastasis. The overall highest incidence of metastasis was in the middle deep cervical lymph node (mid jugular). Sites for predilection for Metastasis from different primary sites. The commonest level of nodes involved was Level III (mid jugular

group) in our study. There is also a higher incidence of nodal involvement in T3 (52%) than T2 (26%) lesions.

For Carcinoma Nasopharynx, there was no one with N0, N1 or N2 presentation. Both the patients presented with N3 upper mid jugular and posterior triangle nodes. Level II, III and V were common nodes and level IV node was present in one case.

For Carcinoma Oropharynx there were 36.3% in N1 while 45.45% were in N2 and no presentation in N3 stage. The commonest level of nodes involved was level II - upper jugular group in our study. There is also a higher incidence of nodal involvement in T3 than T2 lesions.

For Carcinoma Hypopharynx there were 8.3% with Nl stage while 66.66% presented in N2 stage and about 8% presented in N3, stage. Level III involvement was more common in our series followed by Level IV and Level II in descending order of frequency.

For Carcinoma Larynx 12.5% were in N1 stage, 58.3% were in N2 stage and no presentation in N3 stage. Level II and level III nodes

were involved in Ca larynx. Most of the cervical node metastasis came from supraglottis (83%).

6.0 CONCLUSION

Majority of the cervical metastases were due to Squamous cell carcinoma of the head and neck. Certain primary sites have a predilection for certain groups of nodes. Incidence of cervical node metastasis was highest for Nasopharyngeal tumours (100%), followed by Hypopharynx (83%), Oropharynx (82%) and Larynx (71%).

Lesions of Nasopharynx metastasize to level II, II and level V, while lesions of Hypopharynx metastasize to level III, IV,II and a small proportion to level V.

Lesions of Oropharynx metastasize to level II, III and I while lesions of larynx metastasize to level III and II , a small proportion to levels IV .

More patients in this series belonged to the N2 stage followed by patients presenting in N1 stage. The mid jugular group of deep

cervical (Level III) nodes were involved more often than other groups or levels of nodes.

In most of the cancers in the study it is observed that increasing size of the primary had increasing number of nodes as well as an increasing nodal stage.

1. INTRODUCTION

Lymphatic metastasis is the most important mechanism in the spread of head and neck squamous cell carcinoma. The rate of metastasis reflects the aggressiveness of the primary tumour and is an important prognosticator. Not only the presence, but also the number of nodal metastasis, the level in the neck, the size of the nodes, and the presence of extra nodal spread are important prognostic factors.

The single most important factor affecting prognosis for patients with squamous cell carcinoma of the upper aero digestive tract is the stage of disease at the time of initial diagnosis and treatment. Patients who present with tumours localised at the primary site without dissemination to regional lymph nodes enjoy an excellent prognosis. On the other hand, once dissemination to regional lymph nodes takes place, the probability of 5-years survival, regardless of the treatment rendered, reduces to nearly one-half of that seen in early staged patients (Shah 1996). Clearly therefore, the single most important prognostic factor in the treatment of patients with squamous cell carcinoma of the head and neck is the status of cervical lymph nodes. The development of metastatic nodal disease represents a firm statement, by the tumour, of its aggressive malignant nature.

Selective groups of regional lymph nodes are initially at risk for each primary site in the head and neck region. Understanding the sequential patterns of neck metastasis therefore greatly facilitates surgical management of regional lymph nodes.

2. AIMS AND OBJECTIVES

- To determine the incidence of cervical node metastasis by the site of primary.
- To describe the distribution of neck node secondaries by the site of primary.
- To correlate individually the size of tumour with the incidence of cervical node metastasis and the time of initial presentation.
- To determine the different types of malignancy.

3. HISTORICAL REVIEW

Ancient medical manuscripts contain very few references to the surgical treatment of head & neck cancer. Marchette had performed excision of tongue cancer as early as 1664; however the first modern attempts to treat cancer of the head and neck by surgical excision was accomplished with Billroth' s total laryngectomy for cancer in 1873.

During that time, it was widely believed that once the tumor had spread to the cervical nodes, a cure was impossible. Even when it has not, the results of surgery for control of the primary were more horrifying than gratifying. Extensive surgery in a septic field and without antibiotics produced a postoperative complication rate of sepsis and death close to 100%. Few patients fortunate enough to survive the initial operation developed metastatic disease in the neck subsequently.

Warren in 1847 had described an operation for the removal of metastatic nodes from the upper neck. In 1900 Henry Butlin operated on cancer of the tongue in which he removed the cervical lymphatic through Kocher's incision and suggested elective excision of these tissues to treat tongue cancer. But it was in 1906 that George Washington Crile Sr. presented a paper entitled "Excision of cancer of the head and neck" and propounded a systematic operative procedure for removal of cervical lymphatic based on anatomic principles. In his initial report of 132 cases

he related curability to the magnitude of surgical resection and concluded that block dissection was indicated regardless of whether nodes were palpable or not. If no nodes were palpable he advised excision of the immediate lymphatic drainage area. Radical neck dissection was recommended in the presence of palpable nodes.

In the settings of the early 1908, Crile's procedure was quite formidable because of the risk of infection and hemorrhage. Neither antibiotics nor blood group substances (Landsteiner) had been discovered yet. Thus a reasonable alternative to surgery seemed to emerge when Curie introduced radiation therapy for cancer. It was used with great enthusiasm and most radical operations for head and neck cancers were abandoned in favour of radiotherapy till the end of 1930s. However drawbacks of radiotherapy gradually became apparent with increasing numbers of radio necrosis and radio resistant tumors, and the realization of the fact that gross metastatic disease in the neck did not respond so well to irradiation as to surgery.

With the introduction of endotracheal anesthesia, the liberal use of blood transfusion and availability of antibiotics in the 1940s, surgery was favoured. Hayes Martin of the Memorial Hospital, New York devised a combined operation for resection of the primary lesion and the cervical nodes in a single block including mandibulectomy that came to be known

as the 'Commando procedure'. Like Crile, he held that lymph nodes constituted a protective barrier that for a time confine metastatic growth to an area accessible to treatment, and that once beyond this barrier, cancer of the head and neck was hopelessly advanced. Therefore the degree to which regional metastases could be prevented or controlled was the main factor that determined the patients' prognosis. Meanwhile, as Martin was developing his commando operation, radiation therapy acquired sophistication with the successive introduction of fractionated therapy, super voltage irradiation and linear accelerators. These were able to reduce considerably the morbidity of radiotherapy leaving a field more suitable for surgery when this was required.

Radiotherapists and surgeons who had been despairing the result of each others' treatment and advancing their own techniques as the primary treatment of head and neck cancer were able to find a common ground for both methods' with the realization that there were patients who could benefit from both modalities if given as a planned course of integrated treatment regimens.

4. SURGICAL ANATOMY OF NECK NODES

Out of the 800 lymph nodes are present in the human body the neck region has more than 300 lymph nodes. For predicting the site of primary cancer and for planning the treatment for cancer in the upper aerodigestive tract, a thorough knowledge of the lymphatic drainage pattern and sites of nodes is essential.

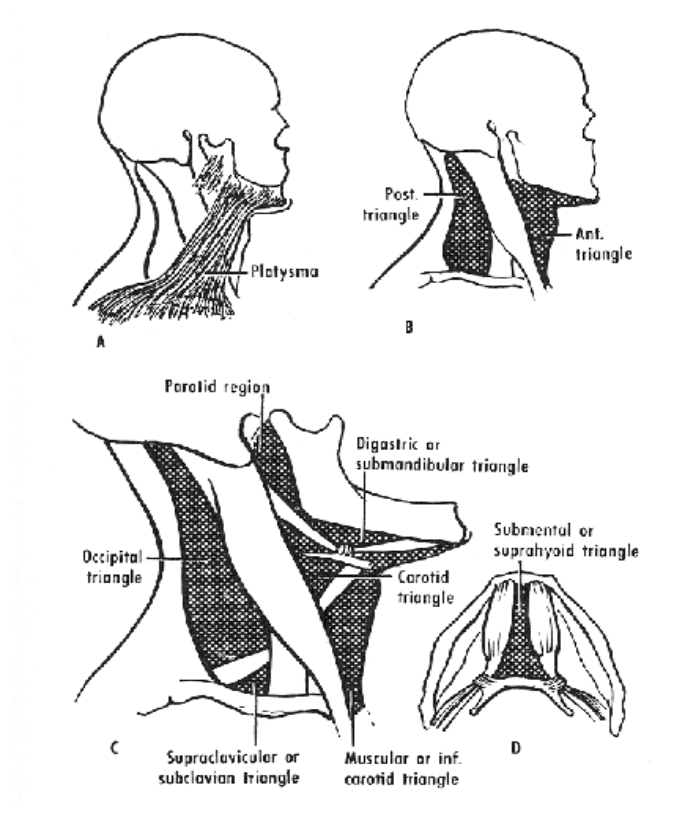
Anatomical divisions of Neck

The neck is divided into triangles which, by convention, are known as the anterior and posterior triangles of the neck. These triangles are three dimensional in shape and change with the position of the neck.

The anterior triangle is bounded by the anterior border of the sternomastoid, the mandible and by the midline of the neck anteriorly. It may be further divided into the submandibular, submental and carotid triangles which together make up the supraomohyoid triangle. From this it will be noted that the sternomastoid muscle and the structures beneath it, by definition, are excluded from either triangle, but most surgeons teach that these structures lie in the posterior triangle. It would be easier if the posterior limit of the anterior triangle were defined as the posterior border of the sternomastoid so that the muscle and associated structures be included in the anterior triangle.

The posterior triangle is bounded by the trapezius muscle, middle third of the clavicle and the posterior border of the sternomastoid muscle. It can be divided further by the omohyoid muscle into the occipital triangle above and the subclavian triangle below. Although this is an anatomical division, a more important division is that made by the accessory nerve which travels in the roof of the triangle from 1 cm above Erb's point (where the greater auricular nerve curves around the sternomastoid muscle) down to enter trapezius in its lower third. Everything that is important in the posterior triangle lies below and inferior to this nerve.

Fig : Triangles of the neck



Each triangle in the neck has a floor, a roof, important boundaries and a number of important contents. This facilitates easy learning of surgical procedures.

Facial neck spaces

An understanding of the fascial spaces of the neck is crucial since operative procedures appear easier, more avascular and are better controlled if they proceed along fascial spaces rather than through them.

Three layers of deep cervical fascia

- The investing or outer layer
- The visceral or middle layer
- The internal layer

The superficial fascia of the neck is a single layer of fibrofatty tissue which lies superficial to the platysma muscle. The deep cervical fascia is more extensive and a much more important layer than the superficial fasica, and lies deep to platysma and occupies important spaces between muscles, blood vessels, lymph nodes and the viscera in the neck. In areas it may be very thin whilst in others it can be rather thick.

The investing layer of fascia invests the whole of the neck and splits to surround the trapezius muscle posteriorly and the sternomastoid muscle laterally. Above it is attached to the superior nuchal line, the mastoid process and the mandible, and below to the spine of the seventh cervical

vertebra, the spine of the acromion, the clavicle and the manubrium. It forms the roof of the posterior and anterior triangles. It also splits to provide fascial sheaths for the parotid and submandibular glands and forms the carotid sheath which surrounds both the internal and external carotid arteries and the common carotid artery, along with the internal jugular vein and vagus nerve, Such a fascial envelope allows movement of these structures upon each other and hence dissection both around and between them. Other cranial nerves are also surrounded by this fascia and these include the glossopharyngeal, the accessory and the hypoglossal nerves, along with the ansa hypoglossi.

The visceral or middle layer of fascia surrounds the middle compartment of the neck to include the pharynx, larynx, oesophagus and trachea, and allows these structures to move upon each other. Included here is the pretracheal fascia which surrounds and envelops the thyroid gland and the parathyroid glands, by convention, lie outside this layer although sometimes it may contain them.

The internal layer of the deep fascia is known as the prevertebral fascial. This surrounds the deep muscles of the neck, i.e. the erector spinae, the levator scapula, the three scalenus muscles, the longus capitus and longus colli. It is crucial to understanding the surgical anatomy of the neck because it provides the floor to the posterior triangle, and has important

relations with some important nerves in the neck. The cervical sympathetic trunk lies superficial to the prevertebral fascia under the carotid sheath, the branches of the cervical plexus lie deep to the fascia but pierce it as they become more superficial to enter the posterior triangle, and both the phrenic nerve and the brachial plexus is deep to this layer.

Head and Neck Lymphatics

The lymphatic drainage of the head and neck is conventionally divided into three systems. These are discussed in turn.

Waldeyer's internal ring

Within the pharynx at the skull base, there is a circular collection of lymphoid tissue aggregates which plays an important part in early immunological development. The ring includes the adenoid, the tubal and lingual tonsils, the palatine tonsil and aggregates of lymphoid tissue on the posterior pharyngeal wall. Tumours arising in this area have a high propensity for lymphatic spread.

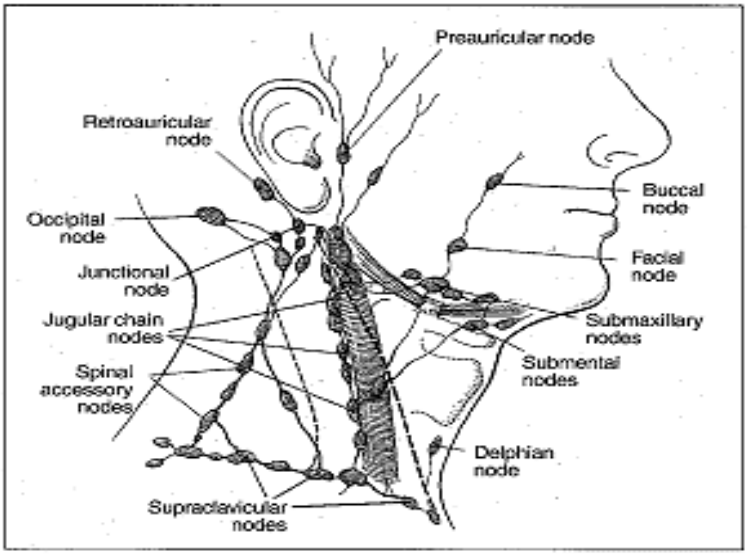


Figure 1: Lymph node groups are most commonly referred to by the names in this illustration.

Superficial lymph-node system (Waldeyer's External ring)

The lymphatic drainage of head and neck tissue is divided into a superficial and a deep system and usually, but not always, the passage of lymph is lateralized and sequential and follows a predefined route from superficial to deep. The superficial nodal system, which drains the superficial tissues of the head and neck, consists of two circles of nodes, one in the head and the other in the neck. In the head, the nodes are situated around the skull base and are known as the occipital, postauricular, parotid or preauricular and then buccal or facial nodes. They are in continuity with the superficial nodes in the upper neck consisting of the superficial cervical, submandibular and submental nodes, along with the anterior cervical nodes. These latter nodes are situated along the external jugular vein and the anterior jugular veins, respectively. This superficial system receives drainage from the skin and underlying tissues of the scalp, eyelids and face, along with Waldeyer's internal ring, nasal sinuses and oral cavity.

Deep system (Cervical Lymph nodes proper)

The deeper fascial structures of the head and neck drain either directly into the deep cervical lymph nodes or through the superficial system first and then into the deep system. The deep cervical lymph nodes proper consist of the junctional nodes, the upper, middle and lower

cervical nodal groups which are situated along the internal jugular vein, the spinal accessory group which accompanies the accessory nerve in the posterior triangle, the nuchal nodes, the visceral nodes in the midline of the neck and nodes in the upper mediastinum. The junctional nodes represent the confluence of nodes at the junction of the posterior part of the submandibular triangle with the retropharyngeal nodes where they meet at the junction of the upper and middle deep cervical nodes.

In general, the passage of lymph within these systems has been well documented using lymphography and it follows a sequential pattern from superficial to deep, and from the upper to lower parts of the neck. These lower confluent vessles form into a jugular trunk which on the right side ends at the junction of the jugular vein and the brachiocephalic vein or joins the right lymphatic duct. On the left side the trunk will usually join the thoracic duct as it arches behind the lower part of the carotid sheath and in front of the subclavian artery to enter the junction of the internal jugular vein with the brachiocephalic vein.

LYMPH NODE LEVELS IN THE NECK

The most widely accepted terminology for categorizing the lymph node groups in the neck was originally described by head and neck surgeons at Memorial Sloan - Kettering Hospital. It employs the use of neck levels or zones and divides the hemi neck into six regions.

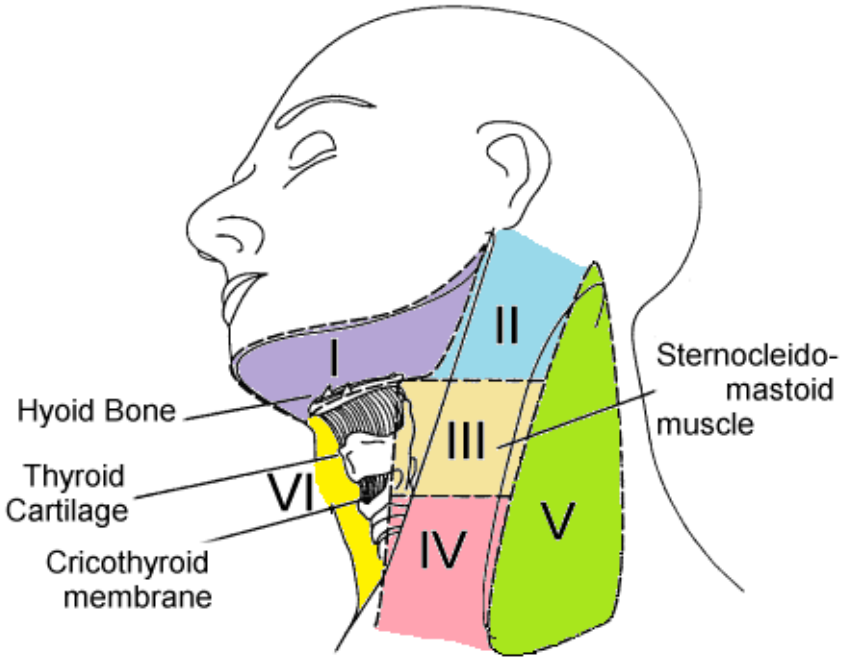
LEVEL - I

There are two important lymph node groups within Level I : the submental group (Ia), and the submandibular group (Ib). The submental nodes are defined as those contained within the boundaries of the submental triangle (anterior belly of the digastric muscles after the hyoid bone). The submandibular lymph node group refers to the nodes lying within the boundaries of the submandibular triangle (anterior and posterior bellies of the digastric muscle and the body of the mandible). The main subgroups include the pre and post vascular nodes and the pre and post glandular groups.

LEVEL - II

Contained within the region defined by Level II are the upper jugular lymph nodes, including the jugulodigastric nodes. These are located around the upper third of the internal jugular vein and adjacent spinal accessory nerve, extending from the level of the carotid bifurcation (surgical landmark), or hyoid bone (clinical landmark) inferiorly, to the skull base superiorly. The lateral boundary is the posterior border of the sternocleidomastoid muscle and the medial boundary is the lateral border of the stylohyoid muscle. Level II can be divided into two sub zones according to the relationship of the nodes with the spinal accessory nerve. Thus nodes that are located anterior to the nerve are considered to lie in

Fig: Lymph Node Levels in the neck



level IIa and nodes located posterior to the spinal accessory nerve are located in level IIb. Involvement of lymph nodes in level IIb is more likely to be associated with primary lesions arising in the oropharynx and nasopharynx.

LEVEL – III

The region defined by Level III contains the middle jugular lymph node group including the jugulo-omohyoid nodes. These nodes are located around the middle third of the internal jugular vein, extending from the carotid bifurcation superiorly (surgical landmark) or the level of the hyoid bone (clinical landmark) to the junction of the omohyoid muscle with the internal jugular vein (surgical landmark) or the cricothyroid membrane (clinical landmark) inferiorly. The lateral boundary is the posterior border of the sternocleidomastoid muscle, and the medial boundary is the lateral border of the sternohyoid muscle.

LEVEL – IV

The region defined by Level IV contains the lower jugular lymph node group. These nodes surround the lower third of the internal jugular vein, extending from the omohyoid muscle superiorly to the clavicle inferiorly. The lateral boundary is the posterior border of the stenlocleidomastoid muscle and the anterior boundary is the lateral border of the sternohyoid muscle.

LEVEL – V

Level V encompasses all lymph nodes contained within the posterior triangle and are collectively referred to as the posterior triangle group. The boundaries include the anterior border of the trapezius muscle (laterally), the posterior border of the sternocleidomastoid muscle (medially), and the clavicle (inferiorly). The nodes in this triangle comprise three predominant lymphatic pathways: nodes located along the spinal accessory nerve as it traverses the posterior triangle; nodes along the transverse cervical artery as it crosses along the lower third of the triangle; and the supraclavicular nodes located immediately above the lateral two thirds of the clavicle. The supraclavicular nodes also extend under the clavicle to include one particular node of importance, the sentinel or Virchow's node.

LEVEL – VI

Level VI includes the lymph nodes of the anterior (central) neck compartment (Robbins). This group is comprised of nodes surrounding the midline visceral structures of the neck extending from the level of the hyoid bone superiorly to the suprasternal notch inferiorly. On each side, the lateral boundary is formed by the medial border of the carotid sheath, located within this compartment are the parathyroidal lymph nodes, paratracheal lymph nodes, lymph nodes along the recurrent laryngeal nerves, and the precricoid (Delphian) lymph node. These lymph nodes and

their connecting lymphatic channels represent pathways of spread from primary cancers arising in the thyroid gland, apex of the pyriform sinus, subglottic larynx, cervical esophagus, and cervical trachea.

ANATOMY OF DRAINING AREAS

NASOPHARYNX

The nasopharynx is a large space with rigid walls, approximately 4 cm high, 4 cm wide and 2 cm deep. The anterior wall is formed by the choana and nasal septum, the floor by the soft palate, and the lateral wall by the eustachian tubes and the fossae of Rosenmuller.

The roof lies inferior to the body of the sphenoid and is occupied by the adenoids in the adolescent; it merges with the posterior wall of the pharynx. The eustachian tubes are triangular in shape, the anterior wall joining the soft palate and the posterior wall being large and prominent. As the posterior wall is mobile, it requires space and this is provided by the fossa of Rosenmuller. This is a lateral extension of the nasopharynx lying above and behind the medial end of the eustachian tube. Its apex reaches the anterior margin of the carotid canal and its base opens into the nasopharynx at a point below the foramen lacerurn medially. The inferior wall of the fossa is formed by a delicate mucosa covering the eustachian tube and levator palati muscle; the posterior wall is formed by the mucosa covering the dense pharyngobasilar fascia.

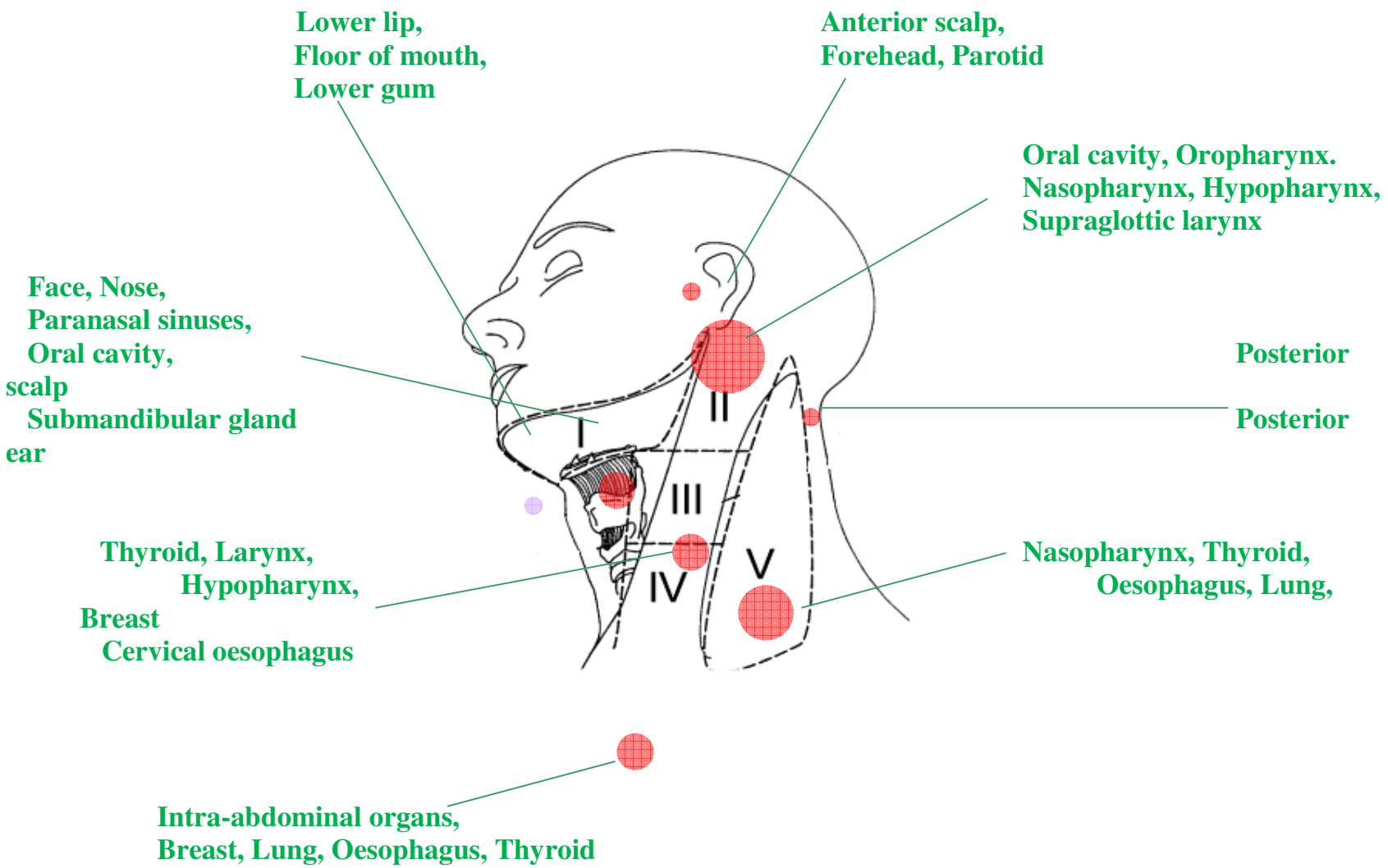
OROPHARYNX

The oropharynx extends from the level of the hard palate superiorly to the level of the hyoid bone inferiorly. Its anterior limit is the anterior faucial pillar, but this is contiguous with the retromolar trigone. It is divided into the following components:

- the anterior wall, which is made up of the base of the tongue posterior to the foramen caecum, the vallecula and the lingual surface of the epiglottis; it is bounded by the pharyngoepiglottic folds.
- the lateral wall, which is made up of the anterior pillar, posterior pillar and palatine tonsil.
- the roof, which is formed by the soft palate containing the two head of palatopharyngeus, the levator palati, the tensor palati and the palatoglossus. The oral surface of the soft palate is in the oropharynx and the nasopharyngeal surface is part of the nasopharynx.
- the posterior wall, which extends from the level of the hard palate to the level of the hyoid and is anterior to the second and third cervical vertebrae. This consists of the superior and middle constrictors and the buccopharyngeal fascia which separates it from the prevertebral fascia.

HYPOPHARYNX

The hypopharynx represents the lowermost part of the pharynx, beginning at the level of the epiglottic tip or the floor of the vallecula, and


Lower lip,
Floor of mouth,
Lower gum
Anterior scalp,
Forehead, Parotid
Oral cavity, Oropharynx.
Nasopharynx, Hypopharynx,
Supraglottic larynx
Face, Nose,
Paranasal sinuses,
Oral cavity,
scalp
Submandibular gland
ear
Posterior
Posterior
I
II
III
IV
V
Thyroid, Larynx,
Hypopharynx,
Breast
Cervical oesophagus
Nasopharynx, Thyroid,
Oesophagus, Lung,
Intra-abdominal organs,
Breast, Lung, Oesophagus, Thyroid

ending at the level of the lower border of the cricoid cartilage. It lies below and posterior to the base of the tongue, and behind and on each side of the larynx. It is divided into three subsites.

1. **Pyriform fossa :** It extends from the pharyngoepiglottic fold to the upper end of the oesophagus. It is bounded laterally by the thyroid cartilage and medially by the hypopharyngeal surface of the aryepiglottic fold and the arytenoid and cricoid cartilages.

2. Post cricoid region : It extends from the level of the arytenoid cartilages and connecting folds to the inferior border of the cricoid cartilage, thus forming the anterior wall of the pharynx.

3. Posterior pharyngeal Wall : It extends from the level of the hyoid bone (or floor of the vallecula) to the level of the inferior border of the cricoid cartilage and from the apex of one pyriform sinus to the other.

LARYNX

The larynx is divided into three sites and each of these sites is divided into sub-sites.

1. Supraglottis
    a. Suprahyoid epiglottis (including tip, lingual and laryngeal surfaces)
    b. Aryepiglottic fold, laryngeal aspect
    c. Arytenoid
    d. Infrahyoid epiglottis
    e. Ventricular bands

Epilarynx (including marginal zone)

Supraglottis excluding epilarynx

2. Glottis
   a. Vocal cord
   b. Anterior commisure
   c. Posterior commisure

3. Subglottis

5. SURGICAL PATHOLOGY

Metastatic tumors are by far the most common non haematopoietic elements to lymph nodes. Carcinoma is the most common tumor type to metastasize to lymph nodes. Others like salivary gland tumor, thyroid gland tumor, malignant melanoma can metastasize to lymph nodes.

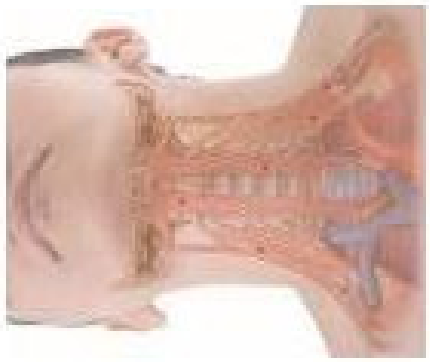
In general, the presence of lymph node metastasis will significantly affect the prognosis. Lymph nodes involved by tumor usually show total or subtotal replacement often with extension to adjacent perinodallymphatics and soft- tissues. Early involvement of lymph nodes usually manifest in the subcapsular sinuses.

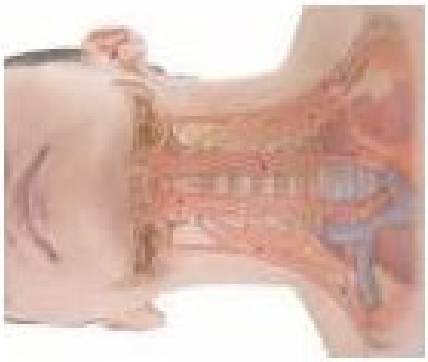
The prognosis decreases with the number of involved nodes and the presence of extracapsular soft tissue expansion may indicate the need for subsequent radiotherapy. Immuno histochemistry can identify occult foci of turnours in the nodes.

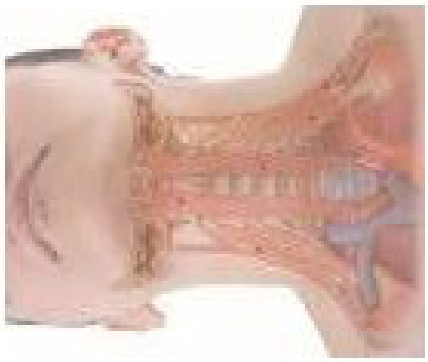
The nodal factors which directly influence the prognosis include the presence or absence of palpable cervical nodal metastasis, the size of the metastatic nodes, the number of nodes- involved and the location of lymph nodes involved by metastatic cancer. In addition to this, the presence of extranodal spread by capsular rupture and soft tissue invasion, perivascular and perineural infiltration by tumour, as well as the presence of tumour emboli in regional lymphatics, also have an adverse impact on prognosis.

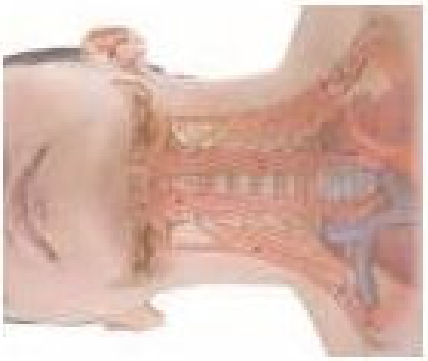
TNM CLASSIFICATION OF REGIONAL NODES

Node	Description
$\mathbf{N_x}$	Regional lymph-nodes cannot be assessed
$\mathbf{N_0}$	No regional lymph node metastasis
$\mathbf{N_1}$	Metastasis in a single ipsilateral lymph node 3 cm or less in greatest dimension
$\mathbf{N_2}$	Metastasis in a single ipsilateral lymph node, more than 3 cm but no more than 6 cm in greatest dimension, or in multiple ipsilateral lymph nodes no more than 6 cm in greatest dimension, or in bilateral or contralateral lymph nodes, no more than 6 cm in greatest dimension
$\mathbf{N_{2a}}$	Metastasis in a single ipsilateral lymph node, more than 3 cm but no more than 6 cm in greatest dimension
$\mathbf{N_{2b}}$	Metastasis in multiple ipsilateral lymph nodes, no more than 6 cm in greatest dimension
$\mathbf{N_{2c}}$	Metastasis in bilateral or contralateral lymph nodes, no more than 6 cm in greatest dimension
$\mathbf{N_3}$	Metastasis in a lymph node more than 6 cm in greatest dimension









6. REVIEW OF LITERATURE

One of the century's foremost surgeons in head and neck cancer, Hayes Martin, has stated that, 'asymptomatic enlargement of one or more cervical nodes in the adult is almost always cancerous'. Nearly 90% of primary malignant neoplasms in the neck including those arising from the thyroid gland are epithelial in origin.

In 1941 and 1943 Drs. G. Papanicolaou and H. Traut published their works on cytological diagnosis of Uterine Cancer. It was in Europe that fine-needle aspiration cytology (FNAC) began to flourish in the 1950s and 1960s.Zajdela in France and Zajicke was among the first of pathologists to embrace FNAC in collaboration with Franzen at the Karolinska Hospital to define precise diagnostic criteria and to determine accuracy in a variety of conditions.

FNAC is used as a preliminary preoperative diagnosis of all kinds of neoplastic processes, benign or malignant, in any organ or tissue of the body and on definitive, specific diagnosis in inoperable cases as a guide to rational treatment.

If a neck mass is suspected to be metastatic, neoplasm arises from below the clavicle in 75% of the cases with the lung, gastrointestinal tract, genitourinary tracts, breasts or testes being the source.

Males over forty with history of chronic tobacco and alcohol abuse are at high risks. A history of prior excision of even small lesions within the head and neck must be pursued. Certain areas such as the tongue, nasopharynx and pyriform sinuses may hold a small primary which gives rise to a cervical metastatsis.

The physical examination should include the evaluation of the cardiopulmonary, renal, gastrointestinal, hepatic and metabolic systems. Following observation of the general appearance of the patient, a suggested procedural format is to examine the skin and mucous membrane of underlying tissue and the associated parts in the following regions.

1. Skin of the face and neck
2. Lips and oral cavity (Gingivae, tongue, floor of mouth, Stensons and Wharton's duct orifices).
3. Oropharynx which includes the tonsils, soft palate, lateral and
4. Posterior pharyngeal walls and base of tongue.
5. Hypopharynx and larynx
6. Nasopharynx
7. Nose
8. Ear
9. Neck and major salivary glands.

Precise and methodical physical examination is very important. The hypopharynx and larynx are examined with a laryngeal mirror and the posterior one third of tongue, valleculae, epiglottis, aryepiglottic folds,

false and true vocal cords, pyriform fossae and subglottic area are noted. During mirror examination of the nasopharynx the vault of the nasopharynx, the choanae and the eustachian tube should be examined. Movement of the mandible should be looked for since the presence of trismus is an ominous clinical sign.

CLINICAL FEATURES

Nasopharygeal Tumour.

Present with nasal obstruction cervical lymphadenopathy, conductive deafness, cranial nerve palsies. Endoscopy may show tumour although submucosal tumour may be missed.

Oropharyngeal Tumour.

Present with sore throat, dysphonia, otalgia, ulcer, pain, trismus, neck mass. Particular attention should be paid, in the examination of tonsils, posterior third tongue and soft palate. Equally important is palpation, particularly of tongue base.

Hypopharyngeal tumours

Present with dysphagia, pain, hoarseness, neck mass, haemoptysis, weight loss. Examination with indirect laryngoscopy may show pooling of saliva in pyriform fossa (Chevalier Jackson's sign), edema of arytenoids, or obvious growth. Presence of laryngeal crepitus should be elicited. The

remainder of the upper aerodigestive tract is examined to exclude a second primary tumour.

Laryngeal Tumour

Present with progressive continuous hoarseness, dyspnoea, stridor, pain, dysphagia, swelling in neck. Indirect laryngoscopy shows growth and vocal cord fixity. Videostroboscopy is useful in early tumour. Supraglottic lesions may be readily detected by their exophytic growth pattern. Thickening or increased erythema of the aryepiglottic folds and false vocal cords may be signs of an early carcinoma. The glottic region of the larynx may demonstrate areas of leukoplakia, erythema or bulky exophytic masses that are sessile or pedunculated.

EXAMINATION OF NECK NODES

Examination of the neck will reveal the presence or absence of lymph node metastasis. Careful palpation preferably performed with the examiner standing behind the seated patient, allows systematic sequential evaluation of the submental, submandibular, jugulodigastric, mid jugular, jugulo omohyoid, posterior triangle and supraclavicular lymph node status.

The number of lymphnodes, lymph node size and any fixation to the skin or adjacent muscle allows the examiner to assign an nodal stage. Because of variable extension into the neck, parotid gland masses may present as a cervical lymph node.

Careful physical examination including neurological examination of the remainder of the head and neck area may reveal evidence of more extensive disease such as cavernous sinus invasion, as documented by extraocular movement disorders or invasion of the cervical sympathetic, as indicated by Horner's syndrome.

Distant metastases are evaluated by history, physical examination, laboratory procedures and radiology. Pleuritic pain or shortness of breath may indicate lung involvement, and distinct pain at a specific site may indicate spread to distant bone.

Before treatment planning, definitive histologic confirmation is necessary. If a primary site is visible, a wedge biopsy specimen should be taken at the edge of the tumour to include some adjacent normal tissue. Touch preparations and other cytological methods are occasionally helpful. Supravital staining with toluidine blue may be useful in showing up areas of abnormal epithelium in sites normally lined by squamous epithelium. Hemotoporphyrin dyes share this characteristic of differential uptake by tumour and normal cells (Schwartz et al., 1999).

The value of triple endoscopy - bronchoscopy, esophagoscopy and direct laryngoscopy has been debated but is advisable for the ideal workup of an advanced head and neck cancer. Since there is a 10% chance of

synchronous primary in upper aerodigestive tract. (Wagengeld et al., 1980).

Fibreoptic bronchoscopy with bronchial washings and biopsy are essential to document the extent of disease and may be used to determine the degree of tumour response during follow up. It reveals evidence of lung cancer in >90% of patients including 9-10% of patients in whom chest X-ray films are negative. CT scans of the thorax provide more precise definition of parenchymal, mediastinal and pleural disease: Esophago gastro duodenoscopy is useful for picking up lesions in the esophagus and stomach and aids in obtaining materials for biopsy. Direct laryngoscopy is necessary to determine the lower most extent of turnours originating in the hypopharynx and post cricoid region and it also provides the clinician the opportunity of removing tissue for histological examination.

If the above regimen of clinical examination and endoscopy does not provide an answer to the site of the primary tumour, fine needle aspiration biopsy of the node should be carried out. FNAC using a 22G or smaller needle has also become a time saving and important asset in evaluation and ultimate treatment. This is a simple, quick and inexpensive procedure, is reliable and can be used as a routine out patient procedure for diagnosis of lymphadenopathy (Orell) . Both aspiration and non aspiration cytology have been found to be of high diagnostic accuracy and have been

suggested as an alternative for tissue diagnosis and hence in planning treatment.

Advantages

The technique is relatively painless, produces a speedy result and in inexpensive. The low risk of complications allows Fine Needle Biopsy to be performed as an office procedure.

Limitations

FNAC may cause local tissue changes like haematoma, infarction, capsular pseudo invasion and pseudo malignant reparative reactions. Also risk factors such as age, coagulation disorders, diabetes, respiratory failure, etc should be taken into account.

FINE NEEDLE ASPIRAION CYTOLOGY

Success of FNAC depends:

- Samples must be representative of the lesion investigated;
- Samples must be adequate in terms of cells and other tissue components
- Samples must be correctly smeared and processed and

- The biopsy must be accompanied by relevant and correct clinical / radiological information.

Increasing use of ancillary techniques such as immunocytochemistry, electron microscopy, cytogenetics and molecular biology has significantly contributed to the potential to make precise, type specific diagnoses.

The essential features to record low power FNAC smear study are cellularity, microarchitecture, cell cohesion, heterogeneity of tissue components, stromal material and proportions between different constituents. Cytological detail analysed at high power comes second.

Air-dried May-Grunwald-Giemsa (MCG) or DiffQuik-stained smears and Wet-fixed Papaicolaou (Pap) and haematoxylin and eosin (H&E) preparations have distinct advantages and disadvantages.

Zajdela first introduced the nonaspiration technique and called it 'fine needle sampling'. The magnifications used in the reproduction of microphotographs are simply recorded as low power (LP), Intermediate power (IP) , high power (HP) and high power using the oil immersion lens (HP Oil), which correspond approximately to x100,x250,x1000 respectively.

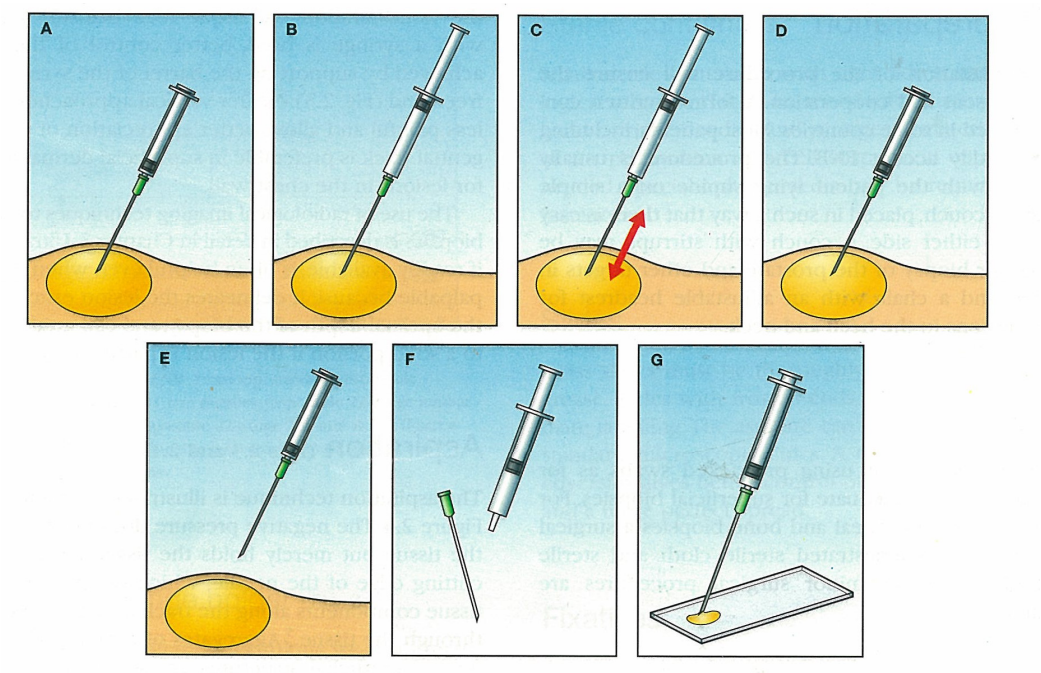
Clear explanation of the procedure will ensure patient's consent and cooperation. The procedure is usually carried out with the patient lying

supine on a simple examination couch, placed in such a way that there is easy access from either side. Skin disinfectant is applied. Local anaesthesia is often not warranted in superficial biopsies. Standard diposable 22-27 gauge, 30 – 50 mm long needles are suitable for superficial, palpable lesions. We use 25 gauge needles for most lesions, but increasingly 27 gauge for cell-rich and vascular tissues such as lymph nodes and thyroids are used. 27 gauge needles are particularly recommended for children and for sensitive areas such as the orbit, eyelids and some intra cutaneous lesions. For hypocellular, fibrotic and desmoplastic lesions in the breast and soft tissues, 23-22 gauge usually gives best results. Good quality disposable 5-20 ml plastic syringes, which produce good negative pressure and fit into a syringe holder is used. The holder leaves one hand free to immobilise and to feel the target lesion and this allows more precision in placing the needle.

Aspiration Technique

Aspiration involves creating negative pressure. The negative pressure holds the tissue against the sharp cutting edge of the needle, which scrapes or cuts softer tissue components as the needle advances. Aggregates of tumour cells are selectively sampled. To increase the yield, the needle should be moved back and forth within the lesion with the negative pressure maintained, more vigourously in fibrous tissues with low

ASPIRATION TECHNIQUE



A. Needle positioned within the target tissue

B. Plunger pulled to apply negative pressure

C. Needle moved back and forth

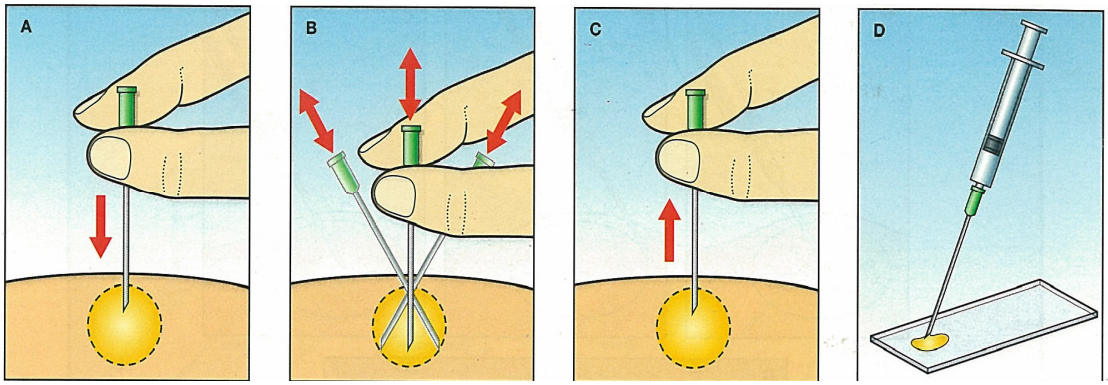
D. Negative pressure released while needle remains in target tissue

E. Needle withdrawn

F. Needle detached and air drawn into syringe

G. Sample blown onto the slide

NON ASPIRATION TECHNIQUE



A. Needle inserted into target tissue

B. Needle moved back and forth inside the target varying the angle

C. Needle withdrawn

D. Needle attached to the syringe and sample blown onto the slide

cell content. Many passes of the needle are sometimes necessary to sample a sufficient number of cells. In lymph nodes, a few rapid passes usually suffice. Multiple passes with maintained negative pressure may increase the amount of blood aspirated and thus dilute the cellular component of the sample. The ideal aspirate has acreamy consistency due to high cell content in a small amount of the fluid and remains inside the needle. The negative pressure must be released before the needle is withdrawn.

Without Aspiration :

The technique of needle biopsy without aspiration was introduced by Zajdela in 1987. Capillary pressure in a fine needle is sufficient to keep the detached cells inside the lume onf the needle. A 27-23 gauge standard needle is inserted into the target lesion and moved back and forth in several directions. This improves precision and representativity in the sampling of small lesions. Admixture with blood is less than with aspiration. The cell yield is less than with aspiration.

Processing the sample:

The sample contained in the needle is expelled on to a clean and dry microscopy slide using air in the syringe. Glass slides must be thoroughly cleaned, dry and free of grease. The aspirate can be smeared between two standard microscope slides.

Smearing

a. **Dry Smear**: An aspirate is referred as "dry" if it has creamy consistency and consists of numerous cells suspended in a small amount of tissue fluid. A dry aspirate is best smeared with the flat of a standard glass slide or 0.4 mm cover slip, moving the slide steadily and evenly over the specimen slide while exerting a light pressure to achieve a thin, even spread. Too much pressure produces artifactual disruption of tissue fragments with loss of micro architecture and smudging of cells.

b. **Wet smear:** A wet aspirate consists of a smaller number of cells suspended in fluid or blood. All bloody samples must be processed quickly before coagulation occurs. The smearing slide is held against the specimen slide at a blunt angle near one end of the slide, allowing the specimen to accumulate in the angle. The smearing slide is then rapidly moved to the middle or the opposite end of the specimen slide, depending on the volume of the specimen. The concentrated cells can then be smeared with the flat of the slide as for a 'dry' aspirate on the same slide or moved to another slide.

c. Indirect smearing: Thin fluid samples are best processed by centrifugation on the cytocentrifuge. Thin Prep technique is also extensively used in FNAC specimens.

Fixation

For fixation of smears, either 70-90% ethanol, or a commercial spray fixative is used. Ethanol is also used for the fixation of cell buttons.

Staining

Diff-Quick or May-Grunwald-Giemsa stains are used for staining.

These alternative methods have minimised the role of preoperative histopathology in spite of being poor correlates as regards morphological assessment. Role of Epstein Barr virus and genome in fine needle aspirates of metastatic neck nodes in the diagnosis of nasopharyngeal carcinoma has been elucidated especially in metastasis from an occult primary and may be diagnostic and predictive of nasopharyngeal carcinoma (Mc Donald 1995). The sensitivity of FNAC for tumour diagnosis is >95% and specificity for the absence of malignant tumour is >97% (Juan Rosai 1996).

Currently nodal disease is staged by clinical examination only. Although palpation has the advantage of being both easy and inexpensive to perform and repeat, both the sensitivity and specificity are in the range of 60-70%. But now, CT Scan may be used to stage the nodal disease even in clinically N_0 Neck. This will avoid unnecessary neck dissection and radiotherapy for occult nodal disease.

Suspicious nodes on CT imaging

1. Size greater than 1 cm (1.5. cm if Jugulodigastric)
2. Rim enhancement following IV contrast
3. Central necrosis
4. Spherical shape.

The value of improved diagnostic acumen in nodal disease would specifically benefit patients with occult metastases and also in high risk patients such as those with midline lesion for evaluation of the contralateral neck. It is also useful in predicting the possibility of muscular, carotid or internal jugular vein invasion and in patients with short, fat, muscular neck or the patient who has already had irradiatipn. Contrast CT can define the extent of the primary turnours. It is also one of the most sensitive diagnostic techniques for detecting retropharyngeal node enlargement. Ultrasound is superior to palpation, its advantage are its low price, can be used for routine follow-up.

Ultrasound guided aspiration cytology is gaining popularity since borderline lymph nodes can not be reliably scored on USG, CT and MRI.

Recent development in diagnostic cytology is demonstration and identification of cell products by immunocytochemistry methods (eg. Immunoalkaline phosphatase). Immune markers like cytokeratin in anaplastic carcinoma and leucocyte common antigen in lymphoma.

Monoclonal antibodies to tumour antigen is useful in distinction between benign and malignant epithelial cells. Best material for immunocytochemistry is tissue fragments obtained by core needle biopsy or section of cell blocks fixed in 10% formalin for immunoperoxidase staining. Advantage is, it provides large number of sections. Thin prep slides of FNAC is more suitable for immunocytochemistry. Cytospin preparation, section of paraffin embedded cell button is useful in cytological investigations of lymphoma.

Recent WHO classification of Non-Hodgkins Lymphoma have aided the role of FNAC along with Flow-Cytometry in diagnosis and sub classification to differentiate reactive lymph node, follicular lymphoma, follicular hyperplasia. Multiple biopsies or the use of cutting core needle to obtain sufficient material.

Immunological methods of studying neoplasms include the use of immuno fluorescence and immunoperoxidase methods for demonstrating cellular features including hormones and enzymes. Oncofetal antigens and other compounds have been used in the diagnosis of head and neck malignancies. Squamous carcinomas of the oral cavity and larynx have variable levels of collagenase activity correlated with poor survival in patients with squamous carcinoma at these sites. Measurement of squamous cell carcinoma antigen by radio immunoassay is also used in

monitoring the course of the disease. Undifferentiated nasopharyngeal carcinomas contain Keratin & they have a very poor prognosis. The ABH Blood group antigens are normal constituents on the surface of many cells including squamous epithelium. The antigens are decreased or absent in about 75% of neoplasms including squamous cell carcinoma.

Other immunological investigations like flow cytometry, tumour ploidy are useful in the diagnosis of primary. Tumour ploidy are useful in the diagnosis of primary. Tumour ploidy can be correlated with lymph node spread in larYngeal squamous cell carcinoma (Capiello et al., 1995).

It has been found that CD44 acts as a marker of metastasis of head and neck melanoma. In cutaneous melanoma biopsy of the first tumour draining lymph node (sentinel node) is performed. Dynamic lymphoscintigraphy is essential for sentinel node localization (pijpers et al., 1995).

Cervical nodal metastasis is the most important prognostic factor in head and neck cancer patients. Extracapsular spread predicts a worse outcome in patients with subclinical cervical metastasis (Alvi et aI., 1996)

Primary head and neck cancer and lymph node metastasis can be effectively visualised with SPECT. It may be used as a supplemental method in the evaluation of head and neck cancer14 (Nagamachi.S et al., 1996). With TYR-PET Scan squamous cell carcinoma metastasis in nodes

can be visualised with high specificity and sensitivity3 (Booams JW et al.,) PET FDG is also increasingly used in the detection of micrometastasis in cervical nodes. Although MRI is being increasingly used, it has surprisingly added little to the diagnostic accuracy of contrast enhanced CT.

Lindberg (1972) reviewed the records of 2004 patients with previously untreated squamous cell carcinoma from various primary sites in the head & neck, and described the incidence and topographical distribution of cervical node metastasis.

In his series, a total of 1,155 (57%) patients had clinical evidence of cervical metastasis on admission. The overall highest incidence of metastases was in the upper deep cervical nodes, and different sites in the oral cavity and upper aerodigestive tract had predilicted sites for metastic inv0lvement as follows.

Nasopharynx

The nasopharynx has a rich lymphatic plexus, particularly in the roof

and in the posterolateral walls. They drain into :

1. Lateral retropharyngeal node
2. Jugulodigastric node
3. Deep nodes of the posterior triangle, the spinal accessory nodes.

Oropharynx

The most important drainage site from the oropharynx, which consists of the retromolar trigone, anterior faucial pillar, tonsil, soft palate, base of tongue & oropharyngeal walls is the jugulodigastric node. Also of importance are the peripharyngeal and retropharyngeal nodes, which lie closely related to the last 4 cervical nerves, the IN, and the internal carotid artery at the base of skull, the most superolateral node of which is called the node of Rouvier. The efferent channels from these nodes pass to the jugulodigastric & posterior cervical groups.

In Lindberg's series, the jugulodigastric node was always the first one to get involved in tonsillar carcinoma which also showed a significant incidence of involvement of the mid and lower jugular as well as posterior triangle nodes.

Cancers of the soft palate, being at or close to the midline had bilateral jugulodigastic involvement. Similarly cancers of the base of tongue which often involve the midline had bilateral jugulodigastric & midjugular node involvement. Likewise, cancers of the oropharyngeal wall tend to involve bilateral jugulodigastric & midjugular nodes as well as posterior cervical nodes since this is also midline structure.

Hypopharynx

The hypopharynx is similar to the larynx and both may have contralateral spread, particularly in those areas that are either close to the midline or have significant communication across the midline such as the epiglottis, the posterior pharyngeal wall and the postcricoid region. Drainage is to levels IV, VI and VII.

Larynx

The larynx drainage is separated into upper and lower systems with embryological connotations and a division that occurs at the level of the true vocal cord. The supraglottis drains through vessels which accompany the superior laryngeal pedicle through the thyrohyoid membrane to reach the upper deep cervical nodes (Level II, III).

The lower system drains directly into the deep cervical nodes (levels III, IV) through vessels which pass through or behind the cricothyroid membrane or drain into the pre laryngeal, pretracheal or paratracheal nodes (level VI) before reaching the deep cervical nodes. Because the vocal cords are relatively avascular, they have an extremely sparse lymphatic drainage, as such, lymph node metastases from carcinomas of this site are uncommon in early stages.

7. MATERIALS AND METHODS

Between November 2010 and October 2011 a total of 104 patients were admitted in two units of ENT Department, Government Rajaji Hospital, Madurai with cervical nodal metastasis. Among these, 61 patients were taken up for this study. 43 patients were eliminated from the study for various reasons like inability to fully evaluate or confirm their diagnosis by histology.

Most of the patients taken up for the study had presented to the hospital for swelling in the neck as one of their main complaints. A detailed history was obtained including information as to whether they had ENT, respiratory, gastrointestinal or urinary symptoms.

A complete physical examination was then carried out including a postnasal examination and an indirect laryngoscopy for characteristics of primary in terms of site, extent, size, macroscopic appearance, degree of local infiltration, presence of synchronous lesion and the T Stage.

The palpable nodes were considered significant if they were more than 1 cm in size, firm to hard in consistency, spherical rather than ovoid and those in the site of drainage of the primary.

The important features noted regarding the nodes during palpation include the location, level of the node, size, consistency, number of nodes and the group to which they belong, as well as signs of extracapsular spread such as invasion of the overlying skin, fixation to deeper tissues or paralysis of cranial nerves or sympathetics. The presence of contralateral nodes and the N-stage was also determined.

The clinical impression of the first observer was confirmed by atleast one other observer.

A fine needle aspiration cytology of the nodes was then done. Biopsy from the primary site was done in all cases to know the nature and degree of differentiation of the primary.

8. OBSERVATIONS AND RESULTS

Period of Study:

The period of study was from November 2010 to October 2011.

Total no of patients with cervical metastasis included in the study - 61

Sex Distribution:

There were 52 males and 9 females with a male to female ration of 5.8:1

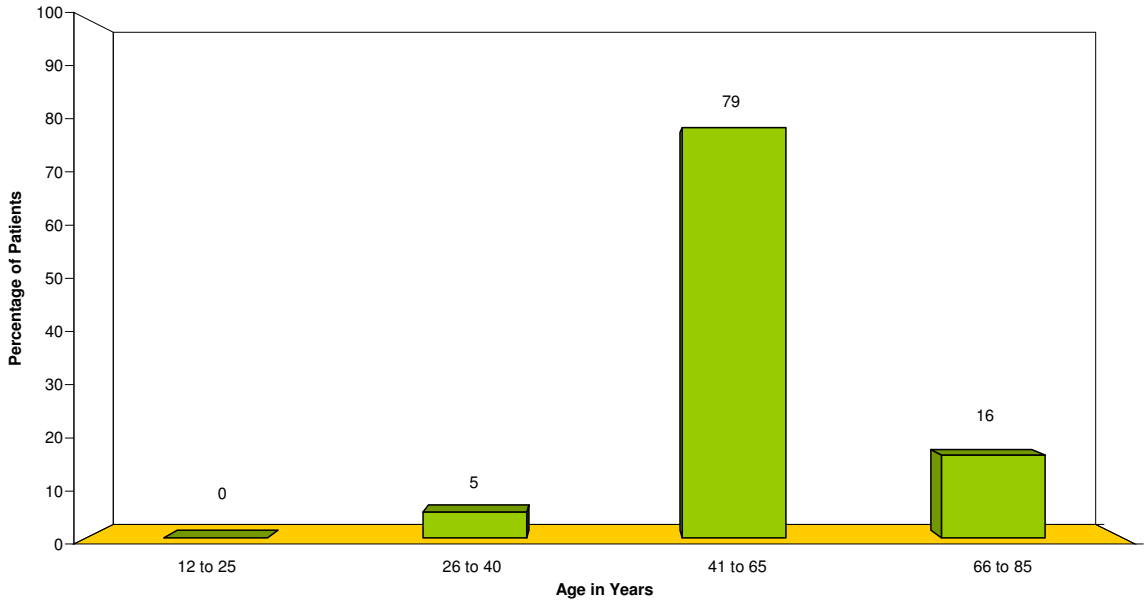
Age Incidence:

The age incidence ranging from 35 years to 76 years was noted with about 79% of patients being in the age group of 41 – 65 and the highest incidence was in the 6th decade.

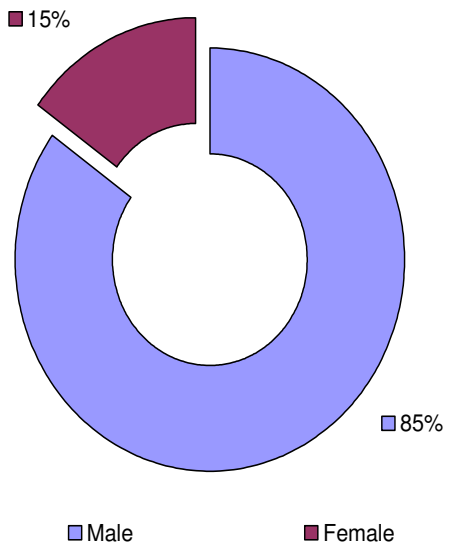
Duration of symptoms:

Majority of the patients present within the first year of developing symptoms. There were 2 % of patients with positive family history. Most of the patients had tobacco or alcohol abuse, men in the form of beedies or cigarettes and women in the form of tobacco chewing.

AGE INCIDENCE



SEX DISTRIBUTION



Distribution of nodal Secondaries with primary

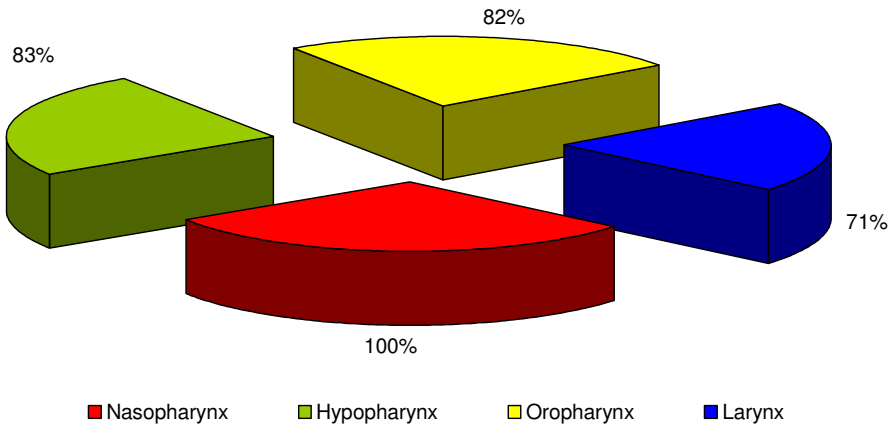
Carcinoma of the Nasopharynx tops the list followed by Hypopharynx, Oropharynx, and Larynx. The incidence of nodal secondaries with primary is shown in the tabular column.

Site	Node Positive (%)
Nasopharynx	100
Hypopharynx	83
Oropharynx	82
Larynx	71

Risk of Lymph node metastasis in patients according to Demographic data :

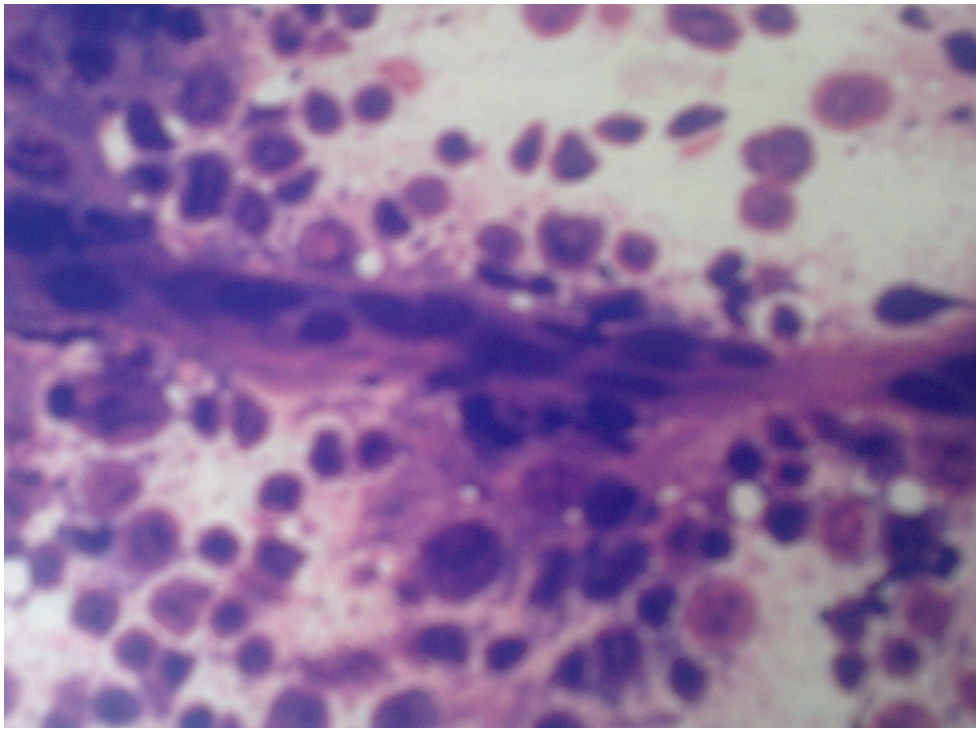
Variable	**Categories**	**Percentage of Patients**
Age	26-40	5%
	41-65	79%
	66-25	16%
Sex	Male	77%
	Female	11%

Distribution of Nodal Secondaries with Primary



Risk of lymph node metastasis in patients according to clinical variables:

Variable	Categories	Percentage of Patients
Duration of symptoms	**1 – 6 months**	46
	7 – 12 months	14
	13 – 60 months	1
Family history of cancer	**No**	59
	Yes	2
Tobacco abuse	**No**	5 %
	Yes	95
Alcohol intake	**No**	12
	Yes	88



LYMPH NODE BIOPSY

DISTRIBUTION OF PATIENTS ACCORDING TO NODAL STATUS

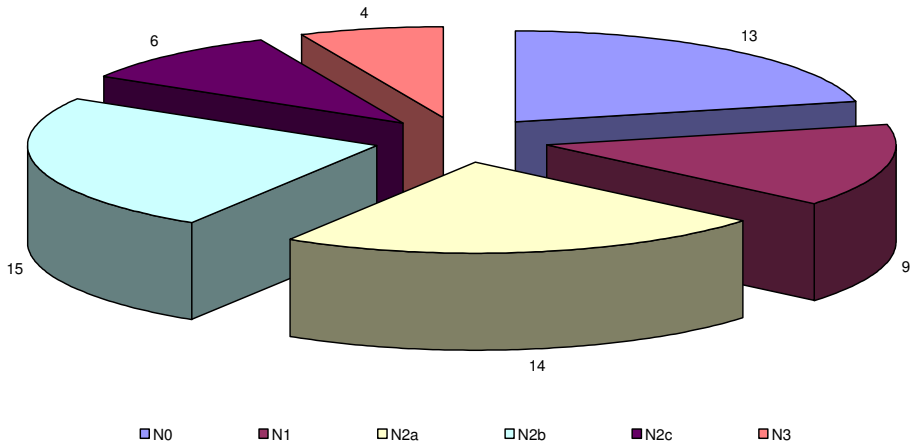
About 21% of patient presented in the N_0 stage. The remaining 79% were node positive. The frequency of each stage category is as follows:

Stage			Percentage
N_0			21%
N_1			14.8%
N_2	N_{2a}	23%	57.6%
	N_{2b}	24.6%	
	N_{2c}	10%	
N_3			6.6%

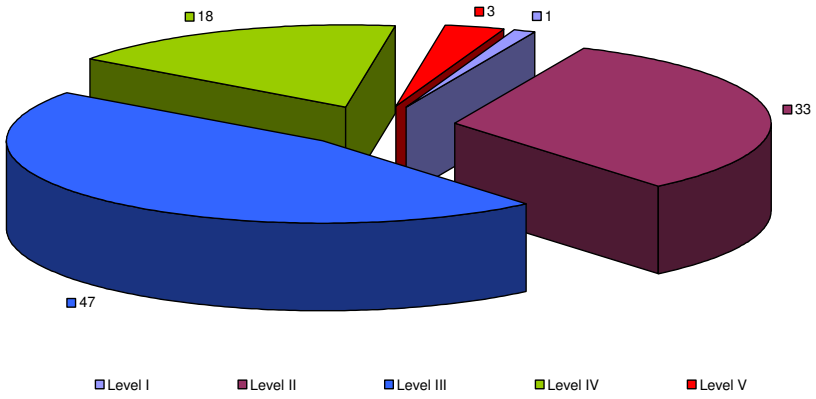
DISTRIBUTION OF PATIENTS ACCORDING TO THE LEVEL OF NODES

Majority of the patients had involvement of mid jugular group (Level III) followed by those with involvement of nodes at Levels II, IV, V, and I in order of decreasing frequency. Shown in the diagram are the absolute numbers of involved levels of nodes & since more than one level is involved in many patients the numbers add up to more than 100%.

Distribution of Patients with Nodal Stages



Distribution of patients with Nodal Levels



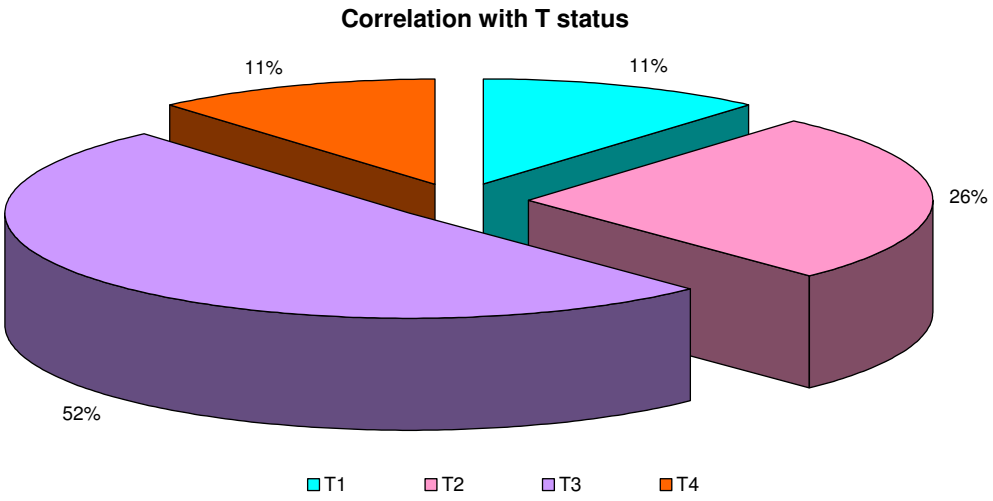
LEVEL II, III, IV, V NODES

LEVEL III, IV NODES

LEVEL I, II, III NODES

LEVEL II, III NODES

LEVEL II, III, IV NODES


Correlation with T status
11%
11%
26%
52%
T1
T2
T3
T4

INDIVIDUAL CORRELATION OF PRIMARY SITE WITH SECONDARIES

Carcinoma Nasopharynx

There were 2 patients with Carcinoma Nasopharynx. Both of them presented with secondaries neck. Of these 1 had T_3 lesion, and the other had T_4 lesion. The N-Stage of these lesions is tabulated below.

	N_o	N_1	N_{2a}	N_{2b}	N_{2c}	N_3	**Total**
T_1	-	-	-	-	-	-	-
T_2	-	-	-	-	-	-	-
T_3	-	-	-	-	-	1	1
T_4	-	-	-	-	-	1	1
Total	-	-	-	-	-	2	

Both the patients had level II,III & IV involvement and one had level V involvement

	I	II	III	IV	V	VI
T_1	-	-	-	-	-	-
T_2	-	-	-	-	-	-
T_3	-	1	1	1	1	-
T_4	-	1	1	-	1	-
Total	-	2	2	1	2	-

GROWTH NASOPHARYNX

GROWTH OROPHARYNX

Carcinoma Oropharynx

Out of 11 patients with Carcinoma Oropharynx two patients were clinically N_0

	N_o	N_1	N_{2a}	N_{2b}	N_{2c}	N_3	Total
T_1	-	-	-	-	-	-	-
T_2	1	1	-	1	-	-	3
T_3	-	2	-	2	-	-	4
T_4	1	1	-	1	1	-	4
Total	2	4	-	4	1	-	11

When correlated with the levels of nodal involvement, a majority had involvement of Level II and Level III. One patient had involvement of Level II.

	I	II	III	IV	V	VI
T_1	-	-	-	-	-	-
T_2	-	2	2	-	-	-
T_3	-	4	4	-	-	-
T_4	1	3	2	-	-	-
Total	1	9	8	-	-	-

Regarding the subsites of oropharynx, Tonsillar Fossa (46%) tumors are common followed by Posterior 1/3rd of tongue (36%) and soft palate (18%). Western literature shows Tonsillar fossa as the most common subsite (50%) followed by base of tongue (40%) and soft palate(10%). (Thaw1ey and 0' Leary 1992)

Posterior 1/3rd of tongue had propensity of bilateral cervical node metastasis.

Subsite	**No. of Cases**	**%**
Tonsil	5	46
Posterior 1/3rd tongue	4	36
Soft palate	2	18

Carcinoma Hypopharynx

Of the 24 patients, 4 had clinically N_0 neck. The remaining patient had node positive neck (83.3%).

	N_o	N_1	N_{2a}	N_{2b}	N_{2c}	N_3	Total
T_1	1	-	1	1	-	-	3
T_2	2	1	2	-	-	-	5
T_3	1	1	2	5	3	2	14
T_4	-	-	2	-	-	-	2
Total	4	2	7	6	3	2	24

The most common levels of lymph nodes involved are level III and IV followed by Level II and Level V.

	I	II	III	IV	V	VI
T_1	-	-	2	2	-	-
T_2	-	-	3	2	-	-
T_3	-	6	13	10	1	-
T_4	-	1	2	2	-	-
Total	-	7	20	16	1	-

GROWTH HYPOPHARYNX

According to the subsite, pyriform fossa tumours (92%) are common followed by postcricoid (8%).

Subsite	**No. of Cases**	**%**
Pyriform Fossa	22	92
Post Cricoid	2	8

Carcinoma Larynx

Twenty four patients presented with Ca larynx out of which 17 had clinically positive cervical metastasis (71%).

	N_o	N_1	N_{2a}	N_{2b}	N_{2c}	N_3	**Total**
T_1	1	-	2	1	-	-	4
T_2	3	-	1	3	1	-	8
T_3	3	3	4	1	1	-	12
T_4	-	-	-	-	-	-	-
Total	7	3	7	5	2	-	24

Level II and III are the most common levels involved in carcinoma larynx. Most of the metastasis were from Supraglottis (83%)

	I	II	III	IV	V	VI
T_1	-	3	3	-	-	-
T_2	-	5	5	1	-	-
T_3	-	7	9	-	-	-
T_4	-	-	-	-	-	-
Total	-	15	17	1	-	-

GLOTTIC GROWTH

SUPRAGLOTTIC GROWTH

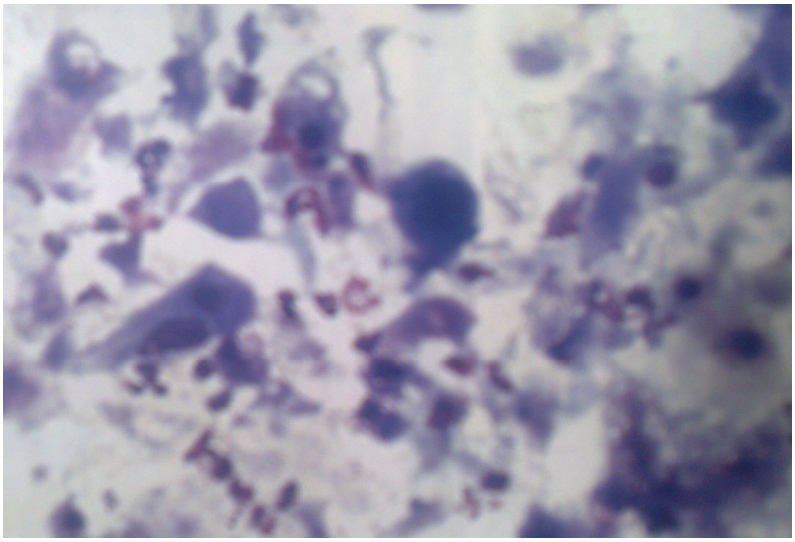
CORRELATION OF SITE OF PRIMARY WITH LEVELS OF NODAL INVOLVEMENT

Site	No of patients	I	II	III	IV	V	VI
Nasopharynx	2	-	2	2	1	2	-
Oropharynx	11	1	9	8	-	-	-
Hypopharynx	24	-	7	20	16	1	-
Larynx	24	-	15	17	1	-	-
Total	61	1	33	47	18	3	-

HISTOPATHOLOGICAL DISTRIBUTION

Almost all patients presented with squamous cell carcinoma. Most of the patients with squamous cell carcinoma were of well differentiated type.

Well differentiated Squamous cell carcinoma



NODAL SECONDARIES BY SIZE OF PRIMARY

Most of the patients presented with T_3 disease (52%) followed by T_2 disease (26%), T_1 disease (11 %) and T_4 disease (11%).

9. DISCUSSION

Out of the 61 patients selected for the study, males predominate over females with a male to female ratio of 5.8 : 1 Western literature quotes a male to female ratio of 5 : 1 with a decreasing trend due to an increase in female tobacco use (Shear *et al.,* 1992). The age incidence is identical to that seen in the West with the maximum incidence in the sixth decade.

Our patients tend to present late in the course of their disease and this is reflected in the high incidence of N_2 (about 57%) neck among those with palpable cervical metastasis.

Unlike in the Lindberg series (Lindberg 1972), where the overall highest incidence of metastasis was in the upper deep cervical lymph node, in this study the overall highest incidence of metastasis was in the middle deep cervical lymph node (mid jugular).

Sites for predilection for Metastasis from different primary sites

The commonest level of nodes involved was Level III (mid jugular group) in our study unlike in Lindberg series where it was reported as Level II (Upper jugular group). There is also a higher incidence of nodal involvement in T_3 (52%) than T_2 (26%) lesions as was the case in Lindberg's series.

Nasopharynx

In Lindberg's series, N_l presentation was seen in around 12%, N_2 in around 25% and N_3 in more than 60%.

In our series there was no one with N_0, N_1 or N_2 presentation. Both the patients presented with N_3 upper mid jugular and posterior triangle nodes. Level II, III and V were common nodes and level IV node was present in one case in Carcinoma Nasopharynx.

Oropharynx

In Lindberg's series the nodal stage at presentation was N_l in 20% N_z in 30% and N_3 in 50%. In our study there were 36.3% in N_1 while 45.45% were in N_2 and no presentation in N_3 stage. The commonest level of nodes involved was level II - upper jugular group in both the Lindberg series and in our study. There is also a higher incidence of nodal involvement in T_3 than T_2 lesions as was the case in Lindberg's series.

Hypopharynx

In Lindberg's series, 25% were in N_1 stage, about 36% in N_2 stage and about 39% were in N_3 stage at first presentation. In our series, there were 8.3% with N_l stage while 66.66% presented in N_2 stage and about 8% presented in N, stage. While upper jugular nodes were involved more often than mid or lower jugular nodes in Lindberg's series, Level III involvement was more common in our series followed by Level IV and Level II in

descending order of frequency.

Larynx

Of the 24 patients studied, 12.5% were in N_1 stage, 58.3% were in N_2 stage and no presentation in N_3 stage. Level II and level III nodes are involved in Ca larynx. Most of the cervical node metastasis came from supraglottis (83%).

10. SUMMARY AND CONCLUSION

Majority of the cervical metastases were due to Squamous cell carcinoma of the head and neck. Certain primary sites had a predilection for certain groups of nodes.

In this study, the incidence of cervical node metastasis was highest for Nasopharyngeal tumours (100%), followed by Hypopharynx (83%), Oropharynx (82%) and Larynx (71%).

Lesions of Nasopharynx metastasize to level II, II and level V, while lesions of Hypopharynx metastasize to level III, IV,II and a small proportion to level V. Lesions of Oropharynx metastasize to level II, III and I while lesions of larynx metastasize to level III and II , a small proportion to levels IV .

More patients in this series belonged to the N_2 stage followed by patients presenting in N_1 stage.

The mid jugular group of deep cervical (Level III) nodes were involved more often than other groups or levels of nodes.

In most of the cancers in the study it is observed that increasing size of the primary had increasing number of nodes as well as an increasing nodal stage.

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PROFORMA

Name :	**Age / Sex :**
DOA :	**IP.NO :**
Address :	

SYMPTOMS

Swelling	**Site**	
	Duration	
	Progress	
	Pressure symptoms	
Throat	**Patch/ulcer**	
	Dysphagia	
	Dyspnoea	
	Change in voice	
Nasal	**Epistaxis**	
	Discharge	
	Obstruction	

Ear	**Ear ache**	
	Block / hard of hhearing	
	Discharge	
Respiratory Symptoms	**Cough**	
	Hemoptysis	

General Symptoms	Weight loss	
	Loss of appetite	
H/o Excision of tumour		
H/o Tobacco abuse		
H/o Alcohol abuse		

SIGNS

Characteristics of swelling	Size	
	Shape	
	Mobility	
	Tenderness	
	Skin over the swelling	

ENT examination		
Neck examination		
IDL scopy		
Postnasal examination		
Neck	**Nodal levels**	
	Trachea	
	Carotids	
	Spine	
Cranial nerves VII, IX, X, XI and XII Sympathetic		
Respiratory system		
Abdomen and Pelvic Examination		

INVESTIGATIONS

Chest X-Ray	
Laryngoscopy	
Bronchoscopy	
Esophagoscopy	
CT scan	
FNAC	
Nodal staging	
HPE of primary	

TREATMENT

MASTER CHART

Sl.No	Name	Age	Sex	IP No.	Primary Site	Tumour Stage	Node Stage	Node Level
Nasopharynx								
1	Jeyaraman	50	M	045883	Nasopharynx	T3	N3	II,III,IV,V
2	Manoharan	43	M	54237	Nasopharynx	T4	N3	II,III,V
Oropharynx								
1	Seeniyappan	55	M	035211	Tonsillar Fossa	T2	N2b	II,III
2	Muthulakshmi	45	F	037241	Posterior 1/3 Tongue	T4	N1	I,II
3	Arumugam	55	M	043215	Tonsillar Fossa	T2	N1	II,III
4	Sadacharam	63	M	055110	Posterior 1/3 Tongue	T4	N2b	II,III
5	Rajendran	67	M	490471	Tonsillar Fossa	T3	N2b	II,III

Sl.No	Name	Age	Sex	IP No.	Primary Site	Tumour Stage	Node Stage	Node Level
6	Marichamy	63	M	053745	Soft Palate	T4	N0	-
7	Ganesan	56	M	063230	Tonsillar Fossa	T3	N2b	II,III
8	Ochappan	50	M	312988	Posterior 1/3 Tongue	T4	N2c	II,III
9	Rakkammal	55	F	024320	Tonsillar Fossa	T3	N1	II,III
10	Sivakumar	40	M	038140	Soft Palate	T2	N0	-
11	Mani	74	M	066963	Posterior 1/3 Tongue	T3	N1	II,III
Hypopharynx								
1	Adaikalam	73	M	051621	Post Crichoid	T3	N2b	III,IV
2	Muthiah	54	M	030221	Pyriform Fossa	T3	N2b	II,III
3	Mani	55	M	040283	Pyriform Fossa	T3	N2b	II,III
4	Meenakshi	66	F	042302	Pyriform Fossa	T3	N1	II,III

Sl.No	Name	Age	Sex	IP No.	Primary Site	Tumour Stage	Node Stage	Node Level
5	Jothi	50	F	032154	Pyriform Fossa	T2	N1	III
6	Muniyandi	54	M	053814	Pyriform Fossa	T4	N2a	II,III,IV
7	Savithiri	45	F	032611	Pyriform Fossa	T3	N3	II,III,IV,V
8	Murugeswari	35	F	052613	Pyriform Fossa	T3	N2b	III,IV
9	Palaniyandi	65	M	046321	Pyriform Fossa	T3	N3	II,III,IV
10	Munian	50	M	021045	Pyriform Fossa	T3	N2c	II,III,IV
11	Pattu	55	F	036708	Pyriform Fossa	T4	N2a	III,IV
12	Durairaj	60	M	231061	Pyriform Fossa	T3	N2b	III,IV
13	Ramachandran	66	M	037993	Pyriform Fossa	T2	N2a	III,IV
14	Paramasivam	70	M	041075	Pyriform Fossa	T3	N2c	III,IV

Sl.No	Name	Age	Sex	IP No.	Primary Site	Tumour Stage	Node Stage	Node Level
15	Kandasamy	53	M	023106	Pyriform Fossa	T1	N2a	III,IV
16	Seeniswamy	76	M	059918	Pyriform Fossa	T3	N0	-
17	Sandhanan	70	M	030444	Pyriform Fossa	T3	N0	-
18	Pitchai	55	M	055519	Pyriform Fossa	T3	N2c	III,IV
19	Sadhasivam	65	M	054435	Pyriform Fossa	T2	N0	-
20	Gopal	70	M	063901	Pyriform Fossa	T1	N2b	III,IV
21	Ganeshpandi	56	M	065291	Pyriform Fossa	T3	N2a	III,IV
22	Sekar	45	M	057611	Pyriform Fossa	T3	N2a	III,IV
23	Selvi	60	F	294126	Post Crichoid	T2	N2a	III,IV
24	Nallaya	65	M	12137	Pyriform Fossa	T1	N0	-

Larynx								
1	Kishore	40	M	092273	Glottis with Supraglottis extension	T3	N1	III
2	Palani	56	M	056321	Glottis	T1	N0	-
3	Muthupalaniyappan	50	M	075621	Supraglottis	T3	N2b	II,III
4	Kalyanasundaram	57	M	045215	Supraglottis	T3	N1	II,III
5	Poownuthai	55	F	042821	Supraglottis	T2	N2a	II,III
6	Panchachram	50	M	303230	Supraglottis	T2	N2b	II,III
7	Subbiah	60	M	016729	Glottis	T2	N0	-
8	Mohanraj	58	M	069768	Supraglottis	T2	N0	-
9	Perumalthevar	57	M	036214	Supraglottis	T3	N0	-
10	Muthuirulan	65	M	049027	Supraglottis	T3	N1	II,III

Sl.No	Name	Age	Sex	IP No.	Primary Site	Tumour Stage	Node Stage	Node Level
11	Alavudin	62	M	04091	Supraglottis	T3	N2a	III
12	Gunasekaran	53	M	50618	Supraglottis	T3	N0	-
13	Muthu	61	M	052093	Supraglottis	T3	N0	-
14	Gandhi	63	M	052668	Supraglottis	T3	N2a	II,III
15	Puthumairaja	60	M	051032	Supraglottis	T3	N2a	II,III
16	Jeyakodi	47	M	036214	Glottis	T2	N0	-
17	Veerabadran	58	M	062514	Supraglottis	T2	N2b	II,III
18	Rajaram	58	M	053110	Supraglottis	T3	N2a	II,III
19	Anbumani	55	M	31235	Supraglottis	T2	N2b	II,III,IV
20	Jeyam	51	M	045217	Supraglottis	T1	N2b	II,III

Sl.No	Name	Age	Sex	IP No.	Primary Site	Tumour Stage	Node Stage	Node Level
21	Sadasivam	63	M	046642	Supraglottis	T3	N2c	II,III
22	Sebastian	68	M	047511	Supraglottis	T2	N2c	II,III
23	Sreenivasan	62	M	057631	Supraglottis	T1	N2a	II,III
24	Pandian	45	M	058232	Supraglottis	T1	N2a	II,III